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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

THE RED TURPENTINE BEETLE, A PEST OF CONIFERS IN THE CALIFORNIA REGION

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What Its Distribution Is

The red turpentine beetle (Dendroctonus valens LeConte) is a native insect, which occurs throughout the timbered parts of California and the rest of the United States. Although not usually a serious pest, it very commonly attacks conifers growing on summer home sites and in other recreational areas. It is widespread in the Bay region of California, where it occasionally kills Monterey pines. It also breeds abundantly in freshly cut stumps.

What Its Injury Looks Like

Trees attacked by the beetle produce a copious flow of pitch, which hardens after a short time, forming a large, irregular, reddish-brown mass around the point at which the beetle entered the tree (figs. 1 and 2). After several months these masses turn a whitish or yellowish pink and become dry and crumbly. The beetles prefer to attack rather thick-barked trees and confine their attacks to the basal area just above and below the ground level. They sometimes attack exposed roots. Only rarely have they been known to extend their attacks as high as 12 feet up the trunk of a tree.

What It Looks Like

The adult beetle (fig. 1, a) is reddish, barrel-shaped, and averages slightly less than three-eighths of an inch in length. The grubs, from which the beetles develop, are legless, curved, ivory white, with dark-brown heads and a brown platelike marking on the back end (fig. 1, c). There is also a double row of brown spots down each side. There are no prominent hairs on the body. The pupa, which is the resting stage that occurs after the larvae have become full-grown, is white, somewhat spindle-shaped, and has rudimentary legs and wing pads showing (fig. 1, d).

What Kinds of Trees It Attacks

Only conifers are attacked, and, of these, pines are the preferred hosts. The trees listed below are known to be attacked. The list is arranged in approximate order of tree preference.

Bay and Coastal Region.-- Monterey pine, knobcone pine, Bishop pine, and Coulter pine.

Cascade and Sierra Region. -- Ponderosa pine, Jeffrey pine, sugar pine, lodgepole pine, western white pine, limber pine, foxtail pine, Digger pine, knobcone pine, weeping spruce, and Engelmann spruce.

Southern California Region.--Jeffrey pine, ponderosa pine, and Coulter pine.

How It Spreads and How It Works

The young beetles chew their way out through the bark of the trees in which they have developed and fly to green trees. They attack only green trees, green stumps, and, rarely, freshly cut logs. The female beetle bores through the bark to the wood and then excavates a gallery between the wood and the bark (fig. 2). On each side of her gallery she lays a large number of eggs in groups of half a dozen or more (fig. 1, b). The eggs hatch after a period of about 2 weeks, and the young grubs, feeding side by side, mine out the green tissues under the bark (fig. 2). It takes at least 8 weeks for the grubs to reach the pupal stage. Just before the pupal stage is reached the grub makes a separate gallery and constructs a small cell, in which molting from the grub to the pupal stage and from the pupal stage to the young adult stage takes place.

Beetles are in flight from March to October, but the main period of attack occurs in April and May in the Bay region, and from April through August in the Sierra region. In general there is one generation a year, but as the female lays eggs over a period of several months, brood in all stages of development can be found under the bark of infested trees at almost any time of the year. Records indicate that where the growing season is short, some beetles require 2 years to develop. In the Bay region, where it is warmer than in the Sierra region, there appear to be two generations a year.

What It Does to the Tree

The attacks of a few beetles may kill a patch of living tissue, but, unless the tree has been weakened from other causes, the beetles are usually unable to establish a brood, and, even if they do, the injury caused by the feeding will often gradually heal over. Where the attacked tree has been weakened from some other cause, or where enough beetles attack so that

their larval galleries overlap, the beetles will kill the tree unless they are destroyed. A rough estimate based on field observations indicates that there must be at least five attacks per square foot over the full circumference of the tree for the attack to prove fatal.

What Can Be Done to Destroy It

If there are only a few attacks on a tree or if they are only on one side, it would be best not to attempt to control the attacking beetles, as they will almost certainly be unable to establish a brood and will sooner or later be killed by the pitch in the tree. However, if a great many beetles attack the complete circumference of a tree at about the same time, they should be destroyed before they are able to lay any eggs, for if they do become well established, it is quite possible that the tree (especially if it is Monterey pine) will die either from the attacks of the beetles themselves or from attacks by other species of beetles attracted to the weakened tree. Often the beetles are attracted to a tree dying or at least severely weakened from some other cause. When this is the case, destroying the red turpentine beetle will not, of course, keep the tree from dying. Two methods for control are given below.

Method 1. -- A method preferred by many entomologists is that of cutting out the gallery of the beetle (figs. 4A and 4B) with a chisel and then coating the exposed wood with a pruning paint. This method is quick, effective, and permanent if the attack is treated before the larvae have had a chance to grow very large. When they are about a third grown they have spread so far that often large areas of bark have to be chiseled away. Care should be taken to avoid cutting bark away from the edges of the burrow and thus exposing the live phloem. The wound caused by chiseling off the bark should be kept as small as possible and still permit reaching the beetles and their brood.

Method 2. -- A method of control that avoids removal of the bark consists of injecting a chemical into the beetle gallery. A medical syringe holding about 1 ounce of liquid works very well, but an oil can that will squirt a stream of liquid with considerable force is equally effective (fig. 3). Ethylene dichloride, which is noninflammable but is sometimes hard to procure, and carbon disulfide, which is easier to get but is highly inflammable, are the two most effective fumigants. The common fly or insect spray that is used in houses against flies and mosquitoes is fairly satisfactory and very easy to procure. It is somewhat more effective if naphthalene flakes in the proportion of 6 teaspoonfuls to a half pint of liquid are dissolved in the fly spray.

To inject a gallery properly, the bark should be shaved off until a small length of the main gallery is exposed or an entrance or exit hole is located. The liquid is squirted in until the gallery will hold no more. The liquid will gradually spread under the bark, so that after a few minutes

more can be squirted in. This process should be continued at least five or six times. The open section is then closed with putty or a pruning paint. When fly spray is used, care should be taken to make the injection at or near the top of the gallery, otherwise the liquid will not reach the beetles at the upper end of the gallery. To be effective, the insecticide must come in contact with the insects.

Often one overlooks a gallery, or the insecticide fails to reach the beetles, consequently the process should be repeated on any galleries that still show signs, such as fresh boring dust or pitch flow, of active beetles.

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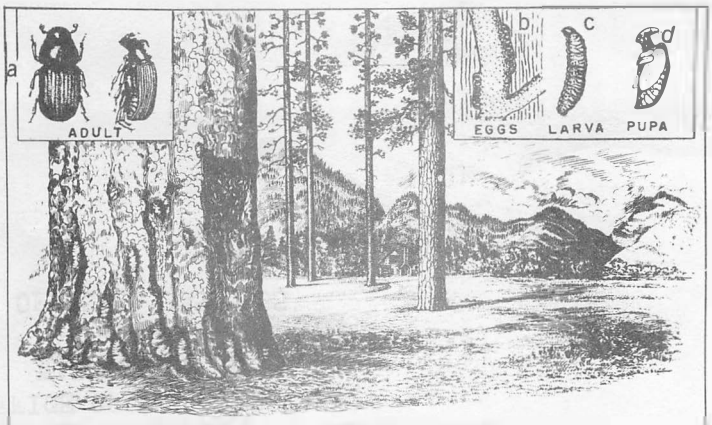

FIG. 1.-- LIFE HISTORY CHART OF THE RED TURPENTINE BEETLE.

FIG. 1.-- SEASONAL DEVELOPMENT OF THE BEETLE IN THE SIERRA REGION. THERE ARE SEVERAL OTHER BARK BEETLES MUCH MORE DESTRUCTIVE TO CONIFERS THAN THIS INSECT, BUT THEY ARE ALL CONSIDERABLY SMALLER, THEY ATTACK HIGHER UP ON THE BOLE, AND THEY DO NOT CAUSE SUCH A COPIOUS FLOW OF PITCH. THIS BEETLE SELDOM ATTACKS A HEALTHY TREE, EXCEPT PERHAPS MONTEREY PINE. ATTACKS BY THIS BEETLE INDICATE THAT THE TREE HAS BEEN WEAKENED OR IS DYING FROM SOME OTHER CAUSE. CONSEQUENTLY IT SELDOM PAYS TO ATTEMPT TO CONTROL THIS INSECT.

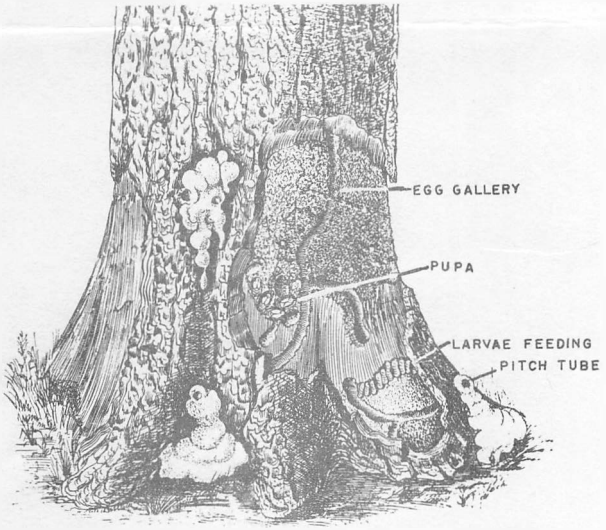

FIG. 2.-- CLOSE-UP OF BASE OF INFESTED TREE.

FIG. 2.-- NOTE THE WAY THE YOUNG LARVAE FEED TOGETHER. WHEN THE BROOD IS AS FAR ADVANCED AS THIS IT IS VERY DIFFICULT TO TREAT THEM. CHISELING THE BARK AWAY TO EXPOSE THE BROOD DISFIGURES THE TREE TO AN APPRECIABLE DEGREE. INJECTION OF A LIQUID AS EXPLAINED IN THE TEXT IS PROBABLY THE MOST PRACTICAL, BUT IT IS OFTEN DIFFICULT TO REACH ALL THE LARVAE WITH THE CHEMICAL OR ITS FUMES.

FIG. 3.-- EQUIPMENT USED IN TREATING INFESTED TREE SHOWING ONE OF THE LIQUID INSECTICIDES WHICH CAN BE USED, A GOOD TYPE OF CAN FOR INJECTING THE LIQUID, A CHISEL AND AXE WHICH ARE THE BEST TOOLS TO USE TO GET AT THE BEETLES WHEN THEY HAVE JUST RECENTLY ATTACKED, AND PRUNING PAINT WHICH IS USED TO COVER THE WOOD AFTER THE BARK HAS BEEN CHISELLED AWAY.

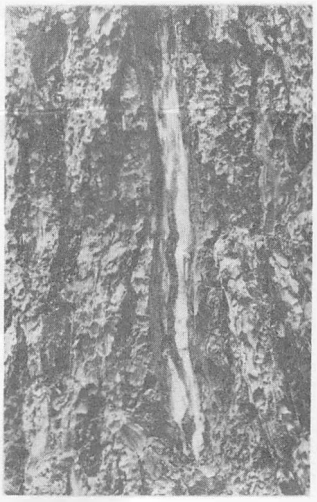

FIG. 4A.

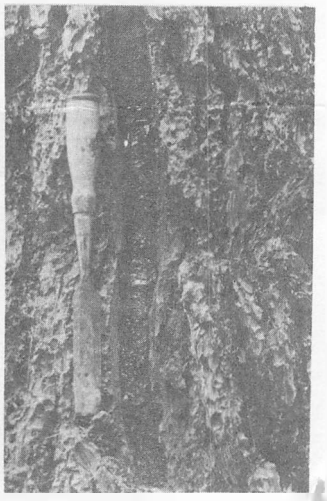

FIG. 4B.

A - METHOD OF TREATING A RECENTLY INFESTED TREE. BARK IS CHISELLED OFF TO EXPOSE THE FULL LENGTH OF THE GALLERY AND THEN (B) THE EXPOSED PORTIONS ARE COVERED WITH A PRUNING PAINT TO HELP PREVENT INFECTION.

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